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A REVIEW OF OUR LOCAL SPECIES OF THE MEMBRACID GENUS OPHIDERMA FAIRM. (HEMIP.-HOMOP.).

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NEW YORK, N. Y.

Notwithstanding the study which has been given to the Membracidae, a study favored in large part by the attraction and interest which is aroused by the grotesque forms of so many of its members—bizarre is the descriptive term commonly and appropriately applied to them—much confusion persists in respect to the generic and specific limitations of its components. Species have been transferred back and forth from one genus to another, new genera erected, only to be reduced, and many descriptions and figures published which, because of insufficient detail and faulty delineation, or quite possibly through lack of rediscovery, have thus far eluded identification. One of the occasions for this confusion lies in the fact that often great variability prevails within the limits of a single species both as to color and form, giving rise to the description and naming of many reputed species which on further study, and accumulation of greater material, have to be sunk into synonymy. Quite possibly, too, hybridization may be common, with resulting varieties which must add to the perplexities confronting the taxonomist. For these reasons among others such papers dealing with the subject as have been pub-

lished have, for the most part, been put forth tentatively as "preliminary" studies, or under similar designations.

In habit the several species are generally more or less gregarious; and while many undoubted species seem to have a wide distribution across the continent, others appear to be extremely local in their habitat. Besides it is believed that the individuals of a colony, although good fliers, seldom stray far from their particular host plant; so that such a colony of a single species persisting through many generations might easily give rise to a local race which, while its individuals may readily be separated from the typical form by some recognizable feature, still presents no structural or other character which would warrant specific separation. Such a race, for instance, appears to be found in *Atymna querci* Fitch, where in a comparatively long series taken by me in Orange County, N. Y., the black of the typical male of that species is replaced by a reddish pink. Similar instances of racial forms will be called to mind in the other orders of insects. But where insects taken in the same general locality and environment, but from different food plants, present differing characters which, however slight, are constant with respect to their particular host, the recognition of such differences as entitling their possessors to be regarded as specifically distinct seems to be warranted.

The foregoing considerations find their application in *Ophiderma* Fairmaire, an exclusively North American genus of comparatively few species, yet presenting the confusion so prevalent in the family. Excluding *Ophiderma mus* Champion, a Central American species whose proper assignation to this genus has met with question, there remain seven species which are listed in VanDuzee's Check List of Hemiptera; and since its publication two others have been described, making a total of nine for the genus, of which six are from the eastern United States. Of these six one may prove to be the male of another, thus cutting our local list to five; to which, however, two other well-characterized and hitherto undescribed species should be added, as well as a form entitled to at least varietal recognition.

The species on which the genus is founded is *Ophiderma salamandra* Fairmaire, the largest in the genus. *Salamandra* is found in the adult stage near New York City from the second week in June till the second week in August, and in my experience almost exclu-

sively on *Quercus rubra*. It is a dull olive and red-brown species, rather less hairy and with the characteristic color pattern more clearly defined in the female than is found in that sex in the closely allied species *O. pubescens* Emmons, with which it is often confounded. The latter is commonly taken in this neighborhood during the same period as the former, but usually on *Quercus velutina*. The obscure, often obsolete, color pattern of the females, the denser pubescence, and much smaller size, readily distinguish *pubescens* from *salamandra*. The males of both species differ from the females in being slightly smaller, darker, more shining, and more distinctly arcuated with a pale vitta from the humerus back to the mid-lateral margin of the pronotum. These two species offer no real difficulties, although it is significant of the variability of the color markings that Mr. VanDuzee refers to *salamandra* as the duller of the two, whereas in my experience it is the brighter, at least in the female sex.

In this connection, however, it seems worth noting that in Florida, and at least as far north as south-central North Carolina, typical *pubescens* is replaced by a form somewhat smaller and more slender and in which the ground color is light green, more or less suffused with pinkish, instead of the usual sordid dull olive brown, and the space between the mid-dorsal and apical vittæ is a bright pinkish red. This form I would designate as *O. pubescens* var. *australis*, n. var., with type female and allotype male from Southern Pines, N. C., taken in May (A. H. Manee), the former in collection of Chris E. Olsen of this city, the latter in my own. Paratypes are in the above collections and in that of Mrs. Slosson, those of the latter having been taken at Jacksonville, Fla.

The next species to be considered is *O. flaviguttula* Goding. In most collections to which I have had access I find it unrecognized. Nor is it treated in the literature other than by way of listing since Dr. Goding described it in 1894; with one notable exception. In a paper published in the December, 1917, number of this JOURNAL entitled "The Genus Ophiderma Fairm." by Gibson and Wells, the species is included in a key, and in the same paper is again referred to in a descriptive and distributional note. Dr. Goding's description was based on a single female taken in Illinois; and in view of the unavailability of his collection containing his types, and the fact that the description closely corresponds to many specimens of *pubescens*, com-

binéd with the apparent absence of other specimens in collectors' cabinets separable from known species and recognizable under that description, the suspicion has prevailed that *flaviguttula* might have to be regarded as a synonym. An inspection of the material in the National Museum at Washington on which Gibson and Wells' paper was based, discloses a considerable number of specimens placed over the name label *O. flaviguttula* Goding, three of which, all females, appear to be substantially identical, and to agree very closely with Goding's description of that species. One, shown by the Museum records to have been taken in Central Missouri by Riley and bearing locality label "C. Mo.," bears a pin label in what is believed to be Dr. Ashmead's handwriting designating it as *O. flaviguttula* God'g., and on the lower left-hand margin appears the abbreviation "Godg detn," which would seem to be interpretable as "Goding's determination." The other two bear locality labels "Md. R. R. Uhler Collection," and "Mass." respectively. In my own collection there is a specimen, also a female, which appears to be identical in species with them, taken by me at Bronxville, N. Y., July 4, 1911. There is no other described *Ophiderma* to which they can be assigned; and the above script makes it fairly certain that this species should be recognized under Dr. Goding's designation, and that the name should not be sunk into synonymy as has been suggested.

For the convenience of students to whom the original description (published in Vol. III of Bulletin Illinois State Laboratory of Natural History) may be inaccessible, I herewith transcribe it, as well as a characterization of my Bronxville specimen above referred to:

"*O. flaviguttula* n. sp.

"Female.—Head triangular, yellowish; eyes prominent, dark brown; ocelli equidistant from each other and the eyes, red; convex, densely pubescent. Prothorax with very slight median carina, densely pubescent, an irregular yellow patch starting at lateral border and extending upwards and forwards, midway between base and apex; an irregular band at base, concolorous with head, extending along sides in a greenish gray line; otherwise dirty brown, lightly punctured; apex of posterior process not reaching apex of tegmina. Tegmina sub-coriaceous at base, lightly punctured, basal half and apex brown. Below yellow, feet and legs brown. Length 6.2 mm.

"Described from one specimen from Illinois (Stromberg). Type in author's collection."

O. flaviguttula Godg.

Female.—Very slender; not coarsely punctured, *sparsely* pubescent. Face yellow, punctures dark; clypeus rounded, extending below marginal line of cheeks; clypeal sutures, inner margins of eyes, ocelli, spots at base of vertex over ocelli, and callosities of pronotum, red. Median carina of pronotum black, interrupted by mid-dorsal white spot. Pronotum not reaching apex of elytra, testaceous, pattern obscurely indicated. Obsolete parallel reddish bands extending from pronotal callosities straight back over humeri. White vittæ rising from mid-lateral pronotal margin to junction with mid-dorsal transverse white spot, narrowly bordered posteriorly with dark reddish; apical fourth with obsolete sub-apical transverse white vitta bordered obscurely with blackish. Dark border of pronotal mid-lateral white vitta continued in band across elytron, broadly whitish before it; base and apex of elytra dark, otherwise hyaline. Beneath pale; femora above, tibiæ in front, black. Length $5\frac{1}{2}$ mm.

Described from specimen in author's collection, taken by him at Bronxville, Westchester County, N. Y., July 4, 1911, on hickory.

It will be noted that aside from differences in color or shade the above two descriptions present two other conspicuously inconsistent characters, *i.e.*, Dr. Goding describes his specimen as *densely* pubescent (thereby suggesting *pubescens*) instead of *sparsely* pubescent; and, although describing the elytra, makes no reference to the mid-elytral dark band, so notable in the Bronxville specimen. However, both in respect to degree of pubescence and the presence of the elytral band, an actual comparison of the latter specimen with that in the National Museum supposed to have been determined by Dr. Goding as his *flaviguttula* discloses no appreciable difference between them.

In addition to the above four specimens a comparatively large series has been studied by me which by reason of depth of color and sharp definition of pattern I have been disposed to regard as constituting still another species. These range from bright red to black in both sexes. Those in my collection I had provisionally designated as *O. definitiva* n. sp. But in view of their gradation in coloring toward the specimen in the National Museum bearing the record of Dr. Goding's determination above referred to (though none is quite so pale and obscurely patterned), their similarity in size, and apparent lack of other structural differential character, I hesitate to give them separate specific rank, and for the present would associate them as variety *definita* with what is here regarded as typical *flaviguttula*.

Godg. This series, with representatives from Texas and Florida to New England and Canada, comprises both sexes; and, if properly assigned to that species, furnishes us with examples of the male, hitherto undescribed and unrecognized. That sex is slightly smaller than the female, and has the mid-lateral pale band broader and notably arcuate over the humeri after the usual male pattern in the genus. The presence throughout the series of the mid-elytral dark band is a constant character, though subject to some variability in definition. In this locality *Quercus rubra* is the favored host plant of this form. Type female, July 19, 1914, and allotype male, June 14, 1914, taken by me at Bronxville, N. Y., in author's collection. Paratypes in collections of U. S. Nat. Mus., Wm. T. Davis, E. P. VanDuzee and Mrs. Slosson.

There remains what seems to be another undescribed species, closely related to the above, represented in my collection by a series of twenty-seven specimens, all females, taken by me during the past two years. While loth on general principles to found a species on material presenting but one sex, the general facies of these specimens is so distinct from any heretofore described, in both color tone and structural outline, that I feel justified in offering the following specific designation based upon them. None of the several collections to which I have had access has revealed a specimen which can be allocated with them. It is hoped that further and earlier collecting in the type locality may discover the male sex, which I suspect appears early in the season and after mating survives but a short time.

Ophiderma grisea new species.

Female.—Type: Rather slender, slightly larger, broader across humeri and more hairy than *flaviguttula* Godg. or its varietal form *definita* (*supra*). Pronotum long, attaining apex of terminal areole, apex in lateral aspect sharply acute. Dorsal line in lateral aspect slightly elevated just back of humeri, succeeded posteriorly by a distinct sinus at mid-dorsal white spot; posteriorly gently arcuate to tip. (In series dorsal line tends to be straight.)

Face dull yellowish drab, clypeal sutures, dots on vertex above ocelli and pronotal callosities, black; ocelli red. Pronotum gray, with buffy admixture on anterior half, obsoletely banded arcuately over humeri with broad whitish vittæ. At mid-lateral pronotal margins broad white vittæ ascend to a junction with white spot at mid-dorsal line, bordered anteriorly (obscurely) and posteriorly (sharply and broadly) with blackish brown, *which is continued across elytra*, and becomes grayish toward pronotal apex; sub-apical transverse vitta

faintly indicated. Elytra whitish before the transverse black band, hyaline behind it, apex with small sharply defined black cloud (larger than in *flaviguttula*) covering apical areole and apical half of cell above it. Body beneath pale; legs pale, femora above and tibiæ anteriorly black. Length 6 mm.

Type in my collection. Taken by me at Litchfield, Conn., July 19, 1918, on *Quercus coccinea*. A series of twenty-six other specimens, all females, taken at the same place between July 8 and August 11, mostly on same species of oak, but a few on neighboring *Quercus rubra*. Paratypes will be placed in the National Museum at Washington and in the American Museum of Natural History at New York City.

This species is close to *flaviguttula* Godg., belonging to the group with banded elytra, but differs conspicuously in its more robust structure, greater average length, more slender and sharper pronotal apex, and in particular in the blue-gray shades lacking reddish admixture, the insect being markedly gray, black and white instead of brownish.

O. flavicephala Godg. is a pretty little red-brown species which is easily recognizable by the broad cream-colored marginal or submarginal vitta, and the extremely dense and long pubescence of the entire pronotum. Confusion is not apt to be encountered here, although in some instances I have found males of two other species associated with it in collections.

Coming now to *O. flava* Godg., we seem to have two definitely distinguishable species standing together in our cabinets, and all females. One of these is undoubtedly new, but before describing it, it becomes necessary to determine to which of the two Dr. Goding's description properly applies. Unfortunately the "types" of his species are not now available, which requires us to rely wholly upon the description itself, and here we meet with our first difficulty. The insect is described as yellow, or in a fresh specimen, green. The females of the two species now under examination are both green! Next, *flava* is said to be similar in stature to *salamandra*, "but much broader between lateral angles." Neither of our green species is broader, and at first blush we are in trouble; but an examination of Dr. Goding's paper shows that he confused *salamandra* and *pubescens*, regarding Emmons' name as a synonym of the former,—and one of our green species does agree with that characterization as applied to

pubescens, while the other does not. Then he states that the apex of the head is "strongly recurved." By this reference is doubtless made to the clypeus, which again agrees with but one of our green species. From the foregoing it would seem possible to determine to which of our very similar green female *Ophidermas* the name *flava* Godg. is applicable.

But still another difficulty is encountered, and that has to do with the male of this species. Female specimens seem to be present in almost all the collections to which I have succeeded in gaining access, but in none of them, nor of those with whose owners or custodians I have consulted, is a male specimen of *Ophiderma* assigned to *flava*. Dr. Goding in his original description of the species stated that it was based on "one male received from Mr. Westcott and one female from Dr. Riley," thus indicating that he found no difference between them other than in the genital organs; and all subsequent papers on the genus have perpetuated this inference. But as my collecting had likewise failed to discover a green male, and as in a closely allied species of which I had taken several examples of both sexes in association and at least two pairs *in copula*, a species I purpose to describe in this paper, the male is dissimilar in color from the female, which on its part corresponds in color and fairly well in other respects with that covered by Dr. Goding's description in question, I was led to write him asking that he again examine his "types" with respect to their sex. After very considerable delay I am now in receipt of a letter from him from Ecuador, in which he writes: "Westcott's example female, error due to mounting on a card which more or less covered genital organs." That confirms my suspicion that the male of *flava* has not yet been recognized. May it not be that in reliance upon the published description of the male and female as alike, our students and collectors, while finding the female of *flava* and correctly assigning it to that species, have failed to recognize a totally differently colored insect of the opposite sex as being of the same species? In my own collection I have long had a male *Ophiderma*, which did not accord with any published description, pinned above my rows of *flava* females. It was so placed because I more than suspected that the male *flava* was not green, because in size and structure it exhibited characters that would be looked for in the male of such an *Ophiderma* as is the female *flava*, because in color pattern

and markings it followed lines similar to those of the males of the allied species above referred to and hereinafter described, and because I had taken it from the same tree (presumably its food plant) from which I had taken females of what I believe to be the true *flava*. Other examples of such males have been noted in other collections, either unassigned or manifestly placed erroneously, though never under *flava*. Since this paper was first drafted there has appeared the review of the genus by Gibson and Wells above referred to, in the course of which the species *O. fraterna* is described as new, based upon three male specimens in the National Museum collection. No female which might plausibly be assigned to *fraterna* has yet been discovered so far as I can ascertain. A recent examination of the type material has confirmed by suspicion that the authors of that paper had before them what it is here suggested may prove to be the male of Goding's *O. flava*. But pending more positive evidence that it is the male of the latter, it may be advisable to retain for it the name *fraterna* Gibson and Wells.

It is now in order to describe the green *Ophiderma* which has been confused with the true *flava*, and which is represented by a considerable series of both sexes before me. Inasmuch as the females are most likely to be confounded with *flava*, I will select that sex for the type.

***Ophiderma evelyna* new species.**

Female.—Type: Slender, strongly hairy pubescent on face and pronotum. Face little broader than long; clypeus rounded, but little surpassing line of cheeks, the latter scarcely if at all sinuate. Pronotum long and slender apically. Elytral hook slender, distinctly upturned at apex. Face and pronotum wholly light green, the face paler. Elytra slightly infuscated at base and apex, nervures pale. Abdomen yellowish green above and beneath. Legs wholly yellowish green, claws dark brown. Length 6 mm.

Male.—Allotype: Smaller than female, slender; pubescence and structure as in that sex. Face yellowish green, immaculate; two minute dots at base of vertex above ocelli. Pronotum comparatively short, not extending more than half way between end of abdomen and apex of elytra; pronotal apex rather broad; color light reddish brown, darker posteriorly, anteriorly strongly washed with yellowish green, concolorous with face, callosities black; a broad arcuate vitta from humeral angle to mid-lateral margin, a mid-dorsal spot, and a sub-apical broad transverse vitta, yellow. Elytra hyaline, nervures brown, dark smoky at basal third, broadly so at apex. Abdomen black above, margins of

segments yellow; beneath, including legs, yellowish green, claws dark brown. Length $5\frac{1}{2}$ mm.

Type and allotype in author's collection. Described from a pair taken by me *in copula* on *Quercus velutina* at Bronxville, Westchester County, N. Y., June 15, 1913. In addition to this pair I have before me a series of twelve males and fourteen females taken at the same place and on the same species of oak; also a female taken at Ithaca, N. Y., and two males, one from DuBois, Ill., and the other bearing the label "L. E. Lea, Agri. Col. Miss." These three become paratypes, and are returned to the collection of Mr. W. D. Funkhouser, who kindly lent them to me. Paratypes will also be placed in the collections of the National Museum, and of the American Museum of Natural History in New York.

This species averages distinctly smaller than *flava*, the females ranging from 6-6½ mm., and the males from 5½-6 mm.; and in the female it is wholly pale green, whereas *flava* is apt to be more or less suffused with rosy, particularly on the apical half of the pronotum and beneath. The form of the hook at the base of the elytra in the specimens examined is much more acute and upturned than in *flava*, and, if reliance can be placed on a structure which is subject to such a degree of variability, may perhaps alone serve to distinguish the two species. The males, aside from size, are easily separable on color differences from *O. fraterna* Gibson and Wells, and from *O. pubescens* Emmons, which latter they more nearly resemble in size and color pattern, though conspicuously paler and less densely hairy. In my experience *flava* is almost always found on *Quercus rubra*, while *evelyna* is found on *Quercus velutina*.

The following key to the several species of the genus as understood by me, including those above described, has been drawn with those published by Mr. VanDuzee and by Gibson and Wells before me; to whom, as well as to all who have assisted me with material and helpful suggestions and advice, and in particular to Messrs. W. D. Funkhouser and Wm. T. Davis, I would acknowledge my indebtedness. It has been my aim in preparing the key to make use of such characters as are readily apparent, such as color, in spite of its variability, and to avoid the use of those which the inexperienced might find difficulty in discerning, as for instance the degree of sinuation of facial outline; and it is believed that by its use the proper specific

assignment of any specimen of the genus in hand may readily be determined.

KEY TO THE SPECIES.

- A. Terminal areole transverse, scarcely bent on its basal line. Dorsal line somewhat elevated posteriorly, but not at all compressed, behind with a slight sinus **nigrocinctus** VanD.
- AA. Terminal areole triangular at base.
 - B. Color bright green, fading to yellowish.
 - C. Pronotum short, scarcely surpassing abdomen.
 - Spots on face and crescents over eyes (pronotal callosities) black **pallida** VanD.
 - CC. Pronotum long, extending beyond abdomen half way or more toward apex of elytra. Face immaculate.
 - Larger species, 6½–7 mm., usually washed with reddish posteriorly; elytral basal hook broad and blunt..... ♀ **flava** Godg.
 - Smaller species, 6–6½ mm., without reddish wash; elytral basal hook more slender, upturned apically..... ♀ **evelyna** n. sp.
 - BB. Color light green, apical half bright pink. Length 5–6½ mm.
 - pubescens** var. **australis** n. var.
 - BBB. Color gray, brown or black, marked with lighter.
 - D. Elytra with dark band across middle.
 - E. Gray without reddish shades; vittæ white; mid-elytral band black. Rather robust across humeri.
 - Pronotum gray with more or less admixture of pale buff; between lateral and sub-apical vittæ blackish; apex of pronotum very acute. Length 6 mm. ♀ **grisea** n. sp.
 - EE. Testaceous to reddish brown; vittæ cream; mid-elytral band dark brown. Slender.
 - Pronotum pale testaceous; pattern almost obsolete, except at mid-lateral pronotal margin. Length 5½ mm.
 - ♀ **flaviguttula** Godg.
 - Pronotum light reddish brown to dark ferruginous or black; pattern well defined, though often interrupted by excess of pigment. Length ♂ 5–5½ mm., ♀ 5½–6 mm.
 - flaviguttula** var. **definita** n. var.
 - DD. Elytra without dark band across middle.
 - F. Pronotum light brown, darker posteriorly.
 - Anterior half of pronotum more or less mottled with yellowish green; face and legs greenish yellow; arcuate lateral and subapical vittæ yellow varying to white. Length 5½ mm. ♂ **evelyna** n. sp.
 - FF. Pronotum gray or grayish brown anteriorly, lighter just beyond middle.

Apical half of pronotum brown with white subapical vitta; hairy, broad, almost reaching apex of elytra in female. Length 5-5½ mm. . . . **compacta** Gibs. & Wells.

FFF. Pronotum dark brown, darker anteriorly, to black.

G. Pronotum shining; not mottled.

Reddish brown to black; slender, 6-7 mm., in length; face, subapical and more or less arcuate lateral vittæ, bright yellow, varying to white; legs pale, femora usually black anteriorly.

♂ **fraterna** Gibs. & Wells.¹

Rich brown; very slender, 4½-5½ mm. in length; broad, straight yellow marginal (♀) or sub-marginal (♂) vitta from eye to just beyond middle, with a transverse subapical vitta in the male.

flavicephala Godg.

Dark brown; robust, 5-5½ mm. in length; narrower, strongly arcuate cream-colored vitta from over humeri to mid-lateral margin. . . . ♂ **pubescens** Emmons.

Dark brown to black; much larger and heavier, 7-8 mm. in length; vittæ much less strongly defined, at times almost obsolete. ♂ **salamandra** Fairm.

GG. Pronotum dull brown, more or less mottled with pale.

Olivaceous brown, usually mottled, especially anteriorly, apically brighter red-brown; vittæ and mid-dorsal pale spot sub-obsolete or obscured by anterior mottling. Densely hairy, robust, smaller species, 5½-6½ mm. in length. ♀ **pubescens** Emm.

Dull reddish brown, more or less mottled anteriorly; vittæ and mid-dorsal pale spot cream, usually strongly marked. Very hairy, large robust species. Length 7-8 mm. ♀ **salamandra** Fairm.

EXPLANATION OF PLATE XXIII.

Figures from which plate was made were drawn by Mr. Chris. E. Olsen.

Fig. 1. *Ophiderma fraterna* Gibson & Wells. ♂. (*O. flava* Goding. ♂. ?)

Fig. 2. *Ophiderma flava* Goding. ♀.

Fig. 3. *Ophiderma evelyna* Woodruff. ♂. Allotype.

Fig. 4. *Ophiderma evelyna* Woodruff. ♀. Type.

Fig. 5. *Ophiderma flaviguttula* Goding. ♀.

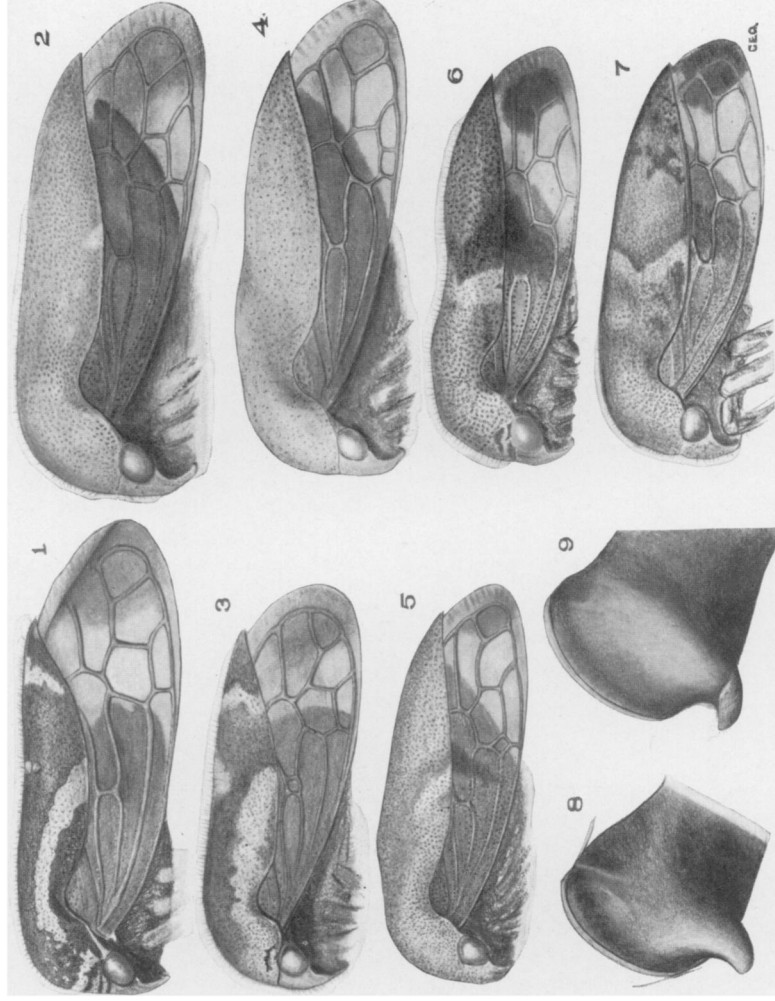
Fig. 6. *Ophiderma flaviguttula* Goding var. *definita* Woodruff. ♀. Type.

Fig. 7. *Ophiderma grisea* Woodruff. ♀. Type.

Fig. 8. *Ophiderma flava* Goding. Elytral hook.

Fig. 9. *Ophiderma evelyna* Woodruff. Elytral hook.

¹ Regarded by the author, on circumstantial evidence, as the male of *O. flava* Godg.



Membracidae.